New Mexico Math Remediation Taskforce Report
July 2016

New Mexico Higher Education Department

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How Did the Task Force Come to Be?

In the summer of 2015 the New Mexico Higher Education Department (NMHED) was awarded a grant through Complete College America (CCA) to send a team to Indianapolis (Appendix 1) to develop a plan to address remediation reform and math pathways. This team decided that three task forces would be formed to study the issues and write reports on math remediation, English remediation and math pathways. As a result, in January 2016, the NMHED notified Chief Academic Officers of New Mexico's institutions of higher education that a one-day remediation and math pathways institute was being planned in March attended by consultants from the CCA (also paid for by the grant). The plan outlined for this work included:

1. Working groups of faculty from across the state would be invited to attend the day-long institute where they would learn about national and current New Mexico best practices in remedial education.
2. Working groups would be asked to meet over the following 3 months to develop recommendations for reforming remedial education and implementing math pathways in New Mexico's institutions of higher education.
3. Recommendations from working groups would be forwarded to all institutions of higher education for review and approval.
4. After approval, working groups would plan a statewide convening where faculty, administrators, registrars, and advisors would develop a plan to implement the approved changes.

Chief Academic Officers were asked to nominate five faculty members to participate in the three working groups: Remedial English, Remedial Math and Math Pathways. The Institute's planning team then selected faculty that represented all sectors of higher education in the state to participate in the working groups. New Mexico Faculty who have been innovative and successful in the delivery of remedial education would also be invited to present their remediation models and data at the March institute.

Chief Academic Officers then requested volunteers from their organizations to serve on the three working groups, as well as to present successful innovative remediation models and data at the institute. Names of such faculty were then provided to NMHED.

The Co-requisite Remediation Consortium Institute was held March 11, 2016, with representatives from NMHED, CCA, and faculty from two-year and four-year institutions from across the state in attendance. CCA presented national and regional data by ethnicity/race concerning required

remediation in math and/or English at both 2- and 4-year non-flagship institutions and its effect on student attrition prior to students passing gateway courses.

CCA suggested there was a structural, not necessarily an instructional, problem with remedial education. A one semester redesigned gateway model was presented. Data was presented for four states--West Virginia, Tennessee, Indiana and Georgia-- regarding their success in moving from a traditional two year remediation model to a one semester co-requisite model. Representatives from The College of Coastal Georgia and Ivy Tech Community College in Indiana presented data from their respective institutions, and gave attendees copies of the implementation plans for Georgia and Indiana.

New models of English remediation in New Mexico were presented by Western New Mexico University, University of New Mexico, and Northern New Mexico College. New models of math remediation and math pathways in New Mexico were presented by San Juan Community College, University of New Mexico, and Santa Fe Community College.

After the presentations, participants were divided into the three working groups, or Task Forces described earlier. Each Task Force selected a chair and began discussing issues. Chairs met at a later date with NMHED to receive additional instructions regarding deliverables and expectations. It was made clear at this meeting that all decisions/recommendations should be supported by data and wherever possible, the groups should use local best practices and tested, effective models. The table below illustrates the deliverables and timeline for the Math Remediation Task Force.

Co-requisite Remediation Reform Deliverables	Due Date
Models	
1. Review remediation models (self-paced, foundations, stretch, and co-requisite) in NM and other states to identify/recommended models – including information about number and types of credit, staffing, student population;	4/17/2016
2. Evaluate cohort data and compare different models based on the same metrics;	
3. Align outcomes to the next course in the series	5/01/2016
Placement	
1. Multiple measures (GPA and placement tests);	
2. Cutoff ranges (graph of measures vs course);	
3. Timeline for reviewing cutoffs	6/01/2016
Non-academic supports	
1. Advisors;	
2. Cohort;	
3. Other	6/01/2016
Assessment of Program	
1. Low rate of success triggers review of program;	
2. What rate would trigger review	7/01/2016
Final Taskforce Report	7/15/2016
Statewide Convening	9/2016

Who is The Math Remediation Task Force?

The Math Remediation Task Force is comprised of faculty from two-year, four-year comprehensive, and four-year flagship higher education institutions throughout the state of New Mexico. Its members have varying levels of experience with designing/implementing multiple math remediation programs including traditional, co-requisite and acceleration models. Each member has been an advocate for her/his students both at the institution-level, as well as at the Math Remediation Task Force-levels.

Members of the Math Remediation Task Force include:

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Since members are physically separated by hundreds of miles, business has been conducted via weekly, one hour teleconferencing sessions. Information has been gathered not only from represented institutions, but also from institutions throughout the state that did not have representation directly on the task force. In addition, interested faculty from non-represented institutions joined in discussion with the Math Remediation Task Force during the New Mexico Mathematical Association of Two Year Colleges (NMMATYC) meeting in May 2016.

Although not all institutions have been a part of the weekly conversations, the Task Force recognizes that each institution has its own needs based on size, resources, student body, etc. Therefore, it is the intent of this Task Force that all institutions interpret recommendations set forth as they best fit the

students and their needs at each institution. The Task Force also intends for this to be a living document and as such should be updated as institutions implement changes, collect more data and gain more knowledge about best practices.

What is "The Task"?

Each institution is ultimately concerned about increasing student retention and graduation rates, hence the essential question becomes:

What systems need to be in place to assist students to be successful in developmental classes, so as to enable them to more quickly enter gateway classes whenever possible, then retain them to complete their degree plans?

The Math Remediation Task Force believes that all students should have access to education, regardless of socioeconomic status, race, ethnicity, gender, or religion. As such, any remediation program design and implementation should be viewed through the "student lens", taking into account not only the student's program of study, but also other factors such as the student's previous math experience and support systems available at the institution.

Current State

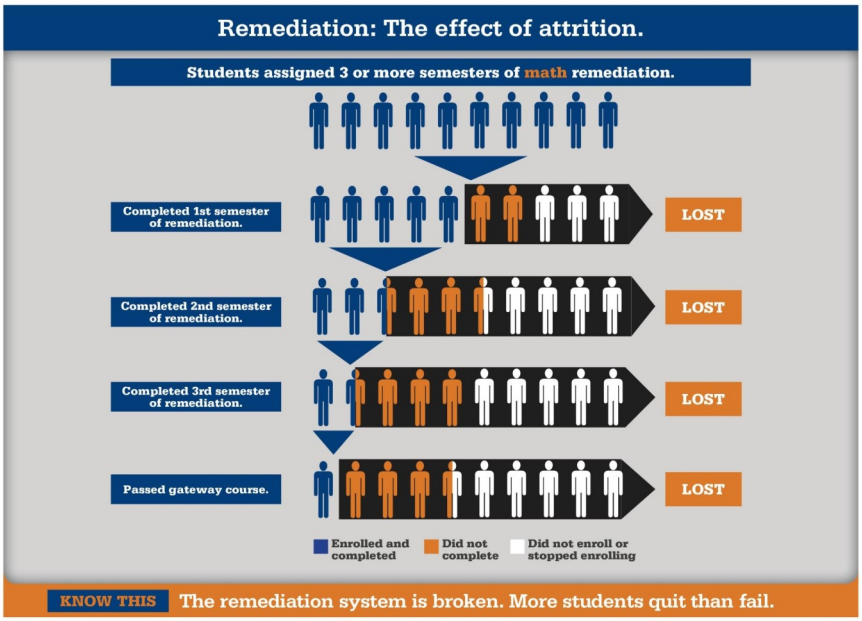
Currently in New Mexico, a large percentage of students coming into both 2- and 4-year colleges require some form of remedial instruction either in English or mathematics (or both) before they can begin taking college gateway courses (for math, this means college algebra, statistics, and liberal arts mathematics). Specifically, 68% of all Pell grant-eligible students entering 2-year institutions require "some remedial instruction," as do 68% of Native American students, 58% of Asian students, 45% of White students, 56% of Black students, and 64% of Hispanic students. For 4-year institutions, the percentages are even greater (63%, 74%, 55%, 74%, and 65%, respectively) [Source: Complete College America].

In the subject of mathematics, at 2-year institutions, the percentages are 54% for Pell-grant students, 45% for Native American students, 41% for Asian students, 38% for White students, 44% for Black students, and 52% for Hispanic students. Percentages for all classifications at 4-year institutions range from 35% to 40%.[Source: Complete College America].

Students who are required to take remedial courses rarely complete gateway courses within two years, with a low of 13% for Black students and a high of 24% for White students. For 4-year institutions, the 2-year gateway course completion rates are higher, varying between 36% for Native American students and 49% for White students.

Nationally, only 11% of students enrolled in remedial courses graduate from a 2-year institution in 3 years, and only 18% transfer to a 4-year institution (with or without a degree) in 4 years.

Attrition is the primary concern with the current remediation model. Nationally, among students who are assigned 3 or more semesters of math remediation before enrolling in the gateway course, roughly half will be lost each semester due to not completing the course or because they did not enroll in the next level of remediation. Consequently, by the end of the third semester, only 15% of those students who began with the first remedial course will remain to enroll in the gateway course, and only 10% will actually go on to pass the gateway course.



Source: Hughes, K., Edgecombe, N., & Snell, M. (2011). "Developmental Education: Why and How We Must Reform It." New York: Columbia University, Teachers College, Community College Research Center. Presentation given at the 2011 League for Innovation in the Community College Annual Conference.

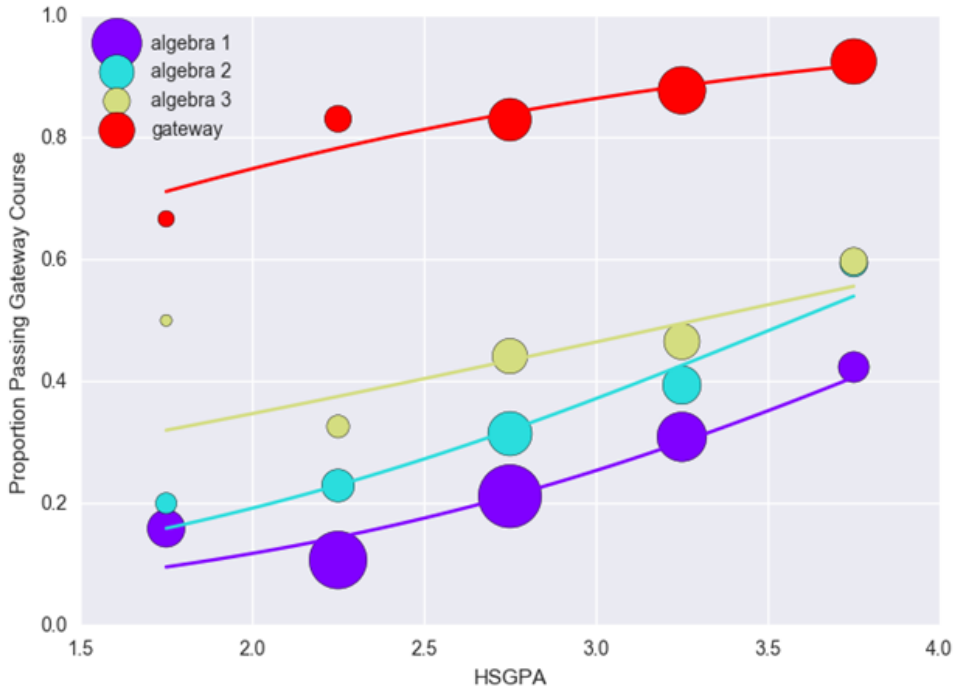
Data from a New Mexico University indicate that the higher a student begins on the developmental math pathway, the more likely they are to pass the gateway course. Of 1,394 students who began with the first of three developmental courses (pre-algebra), 12.3% went to pass the gateway course. Of 647 students who began in the second developmental course (beginning algebra), 28% went on to pass the gateway course. Of 576 students who began with the third developmental course (intermediate algebra), 36.5% went on to pass the gateway course. For the students who did not require remediation, the pass rate for the gateway course was considerably higher, at 86.1% (1180 of 1370 enrolled). This is a common trend among all colleges.

Viewed another way, a student who begins in the gateway course, intermediate algebra, and beginning algebra are 7, 2.97, and 2.27 times more likely to pass the gateway course, respectively, than a student who starts in pre-algebra.

For all three developmental courses, failure to advance to the next course was roughly evenly divided between failing the course and attrition (not registering for the next course). For pre-algebra

students, it was 41.5% attrition and 58.5% failure. For beginning algebra, it was 46.6% attrition, 53.6% failure, and for intermediate algebra it was 53.6% attrition, 46.4% failure.

The following figure shows that students at a New Mexico University regardless of prior-academic preparation (High School Grade Point Average or HSGPA) are more likely to complete their gateway courses if they are initially placed in their gateway course.



What's the problem we're trying to fix?

These data indicate that some students may not be well-served by the remediation model. By spending so much time in remediation, students become frustrated in their multi-semester efforts to complete the basic college mathematics course. For some students, this failure can lead to giving up on their entire college effort or having to make a significant change in their major because they are not able to complete its math requirement. Our goal is to explore options for these students to enter their gateway courses sooner in their college career, and move forward in completing their educational goals.

In keeping with viewing reform through the 'student lens', the Task Force's tact is to examine and reform processes in the order in which the students experience such processes. Through research, we have found that successful remediation reform has combined changes in advising, placement, and curriculum. The body of research would benefit from understanding which of these changes had greatest effect or if the combination is the best strategy. We recommend that, for those with the resources, reform one area at a time, collect data, and determine effectiveness before implementing

another area of reform. Since students' first experience on campus is with advising and placement, this should be reformed before curriculum.

Introduction to Math Placement

Math placement is a process of deciding which math class a student should be initially placed in. This decision is typically made by the student talking to an academic advisor. The placement process generally relies on a set of ACCUPLACER/Compass (placement exam) scores, and/or high school grade-point average (HS GPA) and/or Math ACT/SAT scores (prior academic information) cut-scores. For many colleges, a tiered placement process is used; students are placed using prior academic information if it is available, otherwise they are placed using their placement exam scores. At most 2-year colleges the placement exam scores are used to place most students in their first math class while at 4-year colleges the prior academic information is used most often. Students at 2-year colleges and transfer students at 4-year colleges in New Mexico are not required to submit prior academic information. In the following sections we provide the goals of placement, issues with using placement exams, the role of advising and suggestions/ideas on how to use institutional data to determine placement cut-scores.

Goals of Math Placement

Each student has her/his own set of academic and non-academic goals for attending college. Fifty-seven percent of students interviewed as part of the 2003 U.S. Department of Education longitudinal study indicated that they enrolled primarily to obtain a degree or certificate and 40% wanted either job skills or personal enrichment (U.S. Department of Education, 2003). The goals for 2-year and 4-year college students can differ greatly and the goals can change as they move through the educational system (Bailey, Leinbach, & Jenkins, 2006; Bailey, Jenkins & Leinbach, 2007).

For most students, the math placement process should be structured to maximize their chances of meeting their college goals. For the large number of students who attend college for a degree, those goals are closely tied to completing their degree because of the increased accountability for colleges to graduate students. Since many students attending college in New Mexico can only attend if they receive financial aid, it is important that students complete their degree without taking courses that will not count toward graduation and the federal Successful Academic Progress (SAP) requirements.

Being placed initially into remedial courses (as opposed to a traditional gateway course) has the following effects. These results follow from research that primarily uses the regression-discontinuity design using large 2-year college data:

1. Slight decrease on the chances of graduation,

2. Slight increase on the total number of credits earned,
3. Slight decrease in the total number of college credits earned (does not include remedial courses),
4. Almost no effect on fall-to-fall retention,
5. Slight decrease in the chances of transfer,
6. Slight increase in the gateway math course grade,
7. Significant decrease in the chances of passing gateway math course, and
8. No effect on labor market outcomes (Martorell & McFarlin, 2011; Scott-Clayton, Crosta & Belfield, 2012; Calcagno & Long, 2008; Bettinger & Long, 2005; Bailey, Jeong & Cho, 2005).

These effects do not consider any redesign of gateway courses to support remedial deficiencies. The above list supports minimizing the number of remedial math classes that most students should complete before taking their gateway course. By placing students into lower level remedial math classes, the chances that they will drop out of the remedial math pipeline before they can attempt their gateway math courses increases. The multiplicative effect of having to pass each remedial math class and not taking the next remedial or gateway courses tends to create a lower chance of eventually completing the remedial math class (Fong, Melguizo & Prather, 2015).

The placement process should consider the necessary algebra for the pathway and the programs offered by the college. The placement for college algebra may have different goals than the placement for statistics and liberal arts math. Models such as co-requisite may produce even larger positive effects when reducing the number of remedial courses that students take and improve their chances of passing their gateway math class (Spanning the Divide, 2016; Achieving the Dream, 2016). Different models for reducing the number of remedial courses students take are contained in the **Shortening and Straightening the Pipeline** section of this report.

Accuplacer and Math ACT

Many institutions use placement exams (ACCUPLACER and Compass*) to determine a student's first math class. ACCUPLACER is used by many 2-year colleges and some 4-year colleges because it provides low-cost, computerized math assessments that provide a quick way to assess students' math aptitude. ACCUPLACER is less than optimal for placing students into their first math courses since it provides:

1. Weak correlations between placement test scores and pass rates for both developmental and gateway courses,
2. Placement accuracy rates that vary from 65% to 70%,

3. 1 in 4 students being placed into remedial math course that could be successful in a gateway course (under-placements are more frequent than over-placements), and
4. Placement that does not improve gateway pass rates. (Jenkins, Smith, & Roksa, 2009; Mattern & Packman, 2009; Hughes & Scott-Clayton, 2008; Belfield & Costa, 2012).

Placement errors can be reduced (improved placement) significantly by adding or substituting high school GPA in the placement process (Clayton, 2012; Belfield & Costa, 2012). High school GPA is a better academic success predictor for lower academic performing students while Composite/Math ACT is a better predictor for higher academic performing students (Nobe, Sawyer, 2002). Using additional high school information such as high school math course grades can improve the placement process (Ngo & Kwon, 2015). College Board (ACCUPLACER provider) recommends each institution:

1. Use multiple measures for placement,
2. Periodically review data to make sure the placement process is working, and
3. Determine their own cut-scores (Mattern & Packman, 2009).

If institutions use the ACCUPLACER for placement, College Board provides the online tool ACES (Admitted Class Evaluation Service) (ACES, 2009) for analyzing the validity of institutional placement data and suggests using the Bookmark Method to determine cut scores (Bay, L.).

**ACT has decided to discontinue Compass at the end of 2016. They believe that the placement exam is not contributing as effectively to student placement and success as in the past. They released a statement that many students currently placed into remedial courses using Compass could thrive in a college-level courses.*

Advising

Advising is an important part of the math placement process. Typically the student meets with an advisor (most times not a faculty member) from the advising center who consults a placement guide to determine which math course to place the student in. In some instances the advisor will place the student in a math class not supported by the placement guide because the advisor does not understand how to use the placement guide or the student will ask to be placed in a lower math class. Students tend to underestimate the level of their math academic preparation and some students will prefer to be placed in a math course below what they can pass (Fong & Melguizo, 2015). When students are allowed to thoughtfully self-place they tend to place more evenly across courses and improve academic performance (Kosiewicz, 2014).

To minimize placement errors, it is important that the math department work annually with the advising center to explain how to use the placement guide, create a placement guide that is easy to use (minimize complicated cut-score designs) and present data that shows the advantages of following the placement guide. To further reduce the placement errors and also reduce the time necessary to perform the math placement, institutions can consider creating a computer application that will automatically determine the student's first math course.

Determining Placement

As mentioned above, ACCUPLACER must be used with caution when placing students. The National Council on Measurement in Education (The Code of Fair Test Practices in Education) advises test-users to explain how passing scores were set and gather evidence to support the appropriateness of the cut-scores (National Council on Measurement in Education). Most 2-year colleges (also 4-year colleges) do not routinely validate their placement policy and faculty and administrators do not feel that they have adequate tools and support to use the tools and set cut-offs appropriately (Melguizo, Kosiewicz, Prather, & Bos, 2014). Using high school information in the placement process increases access to higher-level math classes without decreasing a student's chance of succeeding in her/his first college-level math class and eventual credit accumulation (Ngo, Kwon, Melguizo, Prather & Bos). For many 2-year colleges, it is difficult (and inconvenient for students) to secure high school information and use multiple measures to effectively place students into their first math class to maximize academic outcomes (Melguizo, Kosiewicz, Prather, & Bos, 2014).

It would be helpful for the NM Public Education Department and NM Higher Education Department to work together to create an electronic process where high school information is automatically sent to colleges when a student applies to the college (possible clearinghouse). The collected and shared data could include the student's high school GPA, math course grades, state math assessment scores, PARCC scores, end-of-course assessments, math ACT/SAT scores, etc.

In addition, the state could perform a large data study to determine how the placement process can be improved using the student's high school data at each institution in New Mexico. The study would generate a prediction model (maybe using logistic regression) that could be used to determine the probability that a student will pass a gateway course if the student begins in a remedial course and the probability of passing the gateway course if that student begins in the gateway course as a function of all the high school information. Students would be placed in the course that maximizes their chances of completing the gateway course (may need to consider grade in gateway and how they do in subsequent courses). This model would probably place a large percent of students directly into their gateway math course (with some support).

An online application could be created by the state to automate the placement process. The computer application would provide the course number of the first math class in which the student should be placed. An added benefit of this process is that the state can quantify and track the effect of these changes on retention and graduation rates.

ACCUPLACER would be used for placing those students coming from outside New Mexico, students not attending high school, those receiving a GED and non-traditional students. To maximize the validity and accuracy of the ACCUPLACER placement process, each institution should determine its own cut-scores by working with the College Board, using ACES, and performing a Regression Discontinuity Design (Melguizo, Bos, Ngo, Mills & Prather). Adding other assessments of non-cognitive factors, explaining the importance of doing well on the placement exam, and providing placement exam preparation can improve the validity of the placement process.

Shortening and Straightening the Pipeline

There are many models that could potentially reduce the number of courses a student would need to take before attempting a gateway math course ("shortening the pipeline"). While it is desirable to shorten the pipeline through gateway math courses, it is understood that not one model will fit the needs of every student at every institution. Institutions must implement programs that best serve their particular student population. The following models are meant to serve as starting points for the development of programs that could be implemented to achieve the goal of reducing the number of courses a student needs to take before attempting a gateway math course. In addition, alignment of prerequisite or co-requisite courses to the gateway course they serve is critical. In conjunction with developing pathways that direct students' math studies, strengthening the vertical alignment between gateway and foundations courses ("straightening the pipeline") has the potential to increase student success in gateway courses.

- Co-requisite Models: Co-requisite models greatly reduce or eliminate remedial course-work as students simultaneously enroll in college-credit bearing courses with support.

    a. Blended Models

    In this model, underprepared students enroll in traditional gateway courses along-side their prepared counterparts. One potential implementation strategy is closely aligned to ALP (Advanced Learning Program--Community College of Baltimore County). Here a set portion of a gateway section is reserved for underprepared students. Underprepared students in this gateway section take an extra lab or course for support immediately following or immediately before the meeting of the gateway course with

the same instructor, allowing for just-in-time remediation opportunities. Students earn credit for both the gateway course and the support course/lab.

Another implementation strategy allows underprepared students to register for any gateway section. Underprepared students are also required to participate in additional support in the form of tutoring lab attendance. Regardless of the implementation strategy, blended models offer underprepared students the opportunity to enroll in sections of gateway courses with prepared students while requiring enrollment in support courses or labs. As such, there is the potential for students to pass only one of the two courses, or both courses, since they are separate courses

b. Built in Remediation

This model differs from the blended model in that the remediation happens inside the gateway course. For example, a section of a gateway course may be designated as a "plus" section. This section may meet more frequently for more credits. A portion of the course might be used as remediation, reserving the remainder of the course for the content of the gateway course. Meeting more frequently could be a benefit to students needing extra time to learn gateway material. With this model, there is only one grade assigned to the one course. However, the "plus" section may carry the stigma of being a remedial course.

c. Parallel Remediation

While not technically reducing the number of courses a student takes, the option for students to enroll in gateway courses in the same semester as remedial courses could potentially reduce the number of semesters a student spends not attempting a gateway math course.

- Additional Programs/Models: As more data becomes available, we gain perspective on the effectiveness of various components and implementations of co-requisite models. Indeed, we notice that colleges and universities have long been addressing remedial education challenges and developing interventions; co-requisite remediation is not the first model to gain a faddish status. One assumption institutions may make when they see the data produced by CCA is that developing "pathways" is the only change that is worth making to their developmental programs. This is simply not true. In almost every example of statewide co-requisite adoption, additional changes or support programs were employed to boost retention and graduation rates. These include targeted student supports, rigorous content, and systematic faculty development (Jaggars, Hodara, Cho, Xu, 2015). It could be argued that traditional remediation would be just as effective with the aforementioned changes.

Some college systems, such as the one in Florida which allows students to opt out of remedial education courses, have taken a radically different approach to confront the issue of developmental student graduation rates (Hu, 2016). Their methods and policies reflect the ideal that each state has a unique population and one method that works in a particular state may not be as effective in other states. In fact, many states have unique recipes for success for their students, custom- tailored to reflect the studies they have personally conducted. With that noted, listed below are a few examples of programs and models that could be used as an alternate to or in conjunction with corequisite remediation.

a. Self-Paced Modules/Courses

   In a self-paced setting, the amount of time spent on remedial content is reduced for students who are able and motivated to take advantage of the structure. Many web-based programs could be used to facilitate this type of structure. For example, UNM has the option for students placing into pre-algebra thru intermediate algebra to complete those courses via ALEKS using self-paced modules. In addition, depending on the student's' goals, not all modules would need to be completed to move into college credit bearing courses.

b. Stretch Courses

   Students would have the option of "stretching" a gateway course over two semesters. The idea is to give extra time for students to learn not only the gateway material, but also the culture and expectations at the college level. This model would also grant the instructor time to include just-in-time remediation embedded in the gateway course..

c. Placement Exam Preparation Programs

   Most placement exam preparation programs are individualized, self-paced, computer-based courses or workshops and typically help students place higher along their math pathway. These courses work particularly well for students returning to school after a significant lapse in attendance. These students may benefit from refreshing previously mastered skills. Since these students usually place higher along the math pathway, this allows them to complete their gateway course in fewer semesters.

   Northern New Mexico College (NNMC) has created a free Summer Bridge Program that, using *Pearson MyMathLab*, in the Summer of 2014, had a 79% completion rate and resulted in a 74% reduction in students requiring remedial math. Santa Fe Community College (SFCC) has tried a similar week-long Bridge Program and, while the sample sizes have been small, has produced results similar to NNMC. SFCC is currently working on scaling up their program to do a 2-year study. They are basing their program on the success of the *Accelerate* program, which was a self-paced math

program using ALEKS online courseware and was designed by 2- and 4- year institutions throughout northern New Mexico over the summers of 2010 to 2015. Results of this program suggest that models like this effectively increase success rates for all students and close the achievement gap (Rivera, Ibarra, Howland-Davis, 2016).

UNM-Valencia (UNM-VC) had also implemented a free 8-day Math Enrichment Summer Workshop, using *Pearson MyMathLab* and other resources, in summer 2016, with results similar to both NNMC and SFCC. It was geared toward helping students (incoming freshmen and current students who had not yet taken a math course) raise their placement scores so as to test into a higher level of math. Sixty-seven percent of the participants effectively shaved a semester off their math sequence. This is part of a five-year U.S. Department of Education Title V grant geared toward increasing pass rates (and, ultimately, retention and graduation rates) for students in developmental math courses. Although this was its first year and the sample size was small, results were encouraging. This program is expected to be institutionalized.

Below are three models of what a new developmental pathway could look like. We want to emphasize that these are models (suggestions) only, which could be used explicitly or changed to fit the school's needs. In general, it should be noted that developmental courses should be designed to align with a particular pathway, which can significantly reduce the number of developmental courses needed for the Statistics and Liberal Arts math pathways. Also, while we make suggestions for shortening the pathway for College Algebra we would like to note that when we presented these ideas to other New Mexico faculty at the New Mexico Mathematical Association of Two-Year Colleges (NMMATYC) conference it was clear that many thought shortening this pathway would be a detriment to students' foundational skills. Generally, faculty believed that we should make no recommendation for shortening the College Algebra pipeline, since it is the gateway course leading into the Calculus sequence. However, there are some schools, like NNMC and Eastern New Mexico University (ENMU), who have shortened this pipeline with great success. Therefore, we are including some suggestions to show how this pipeline could be shortened and leave it up to the individual schools to determine what will work best for them.

When considering what model or models would best serve the students of an institution, it is also important to consider the faculty time and compensation that would be required to implement the chosen model. Are the co-requisite courses labs? Are they full courses? Do they count toward a member's load? Meeting the needs of the students should be at the forefront of the discussions but not at the expense of considering what is fair to faculty and staff who are working to support the students.

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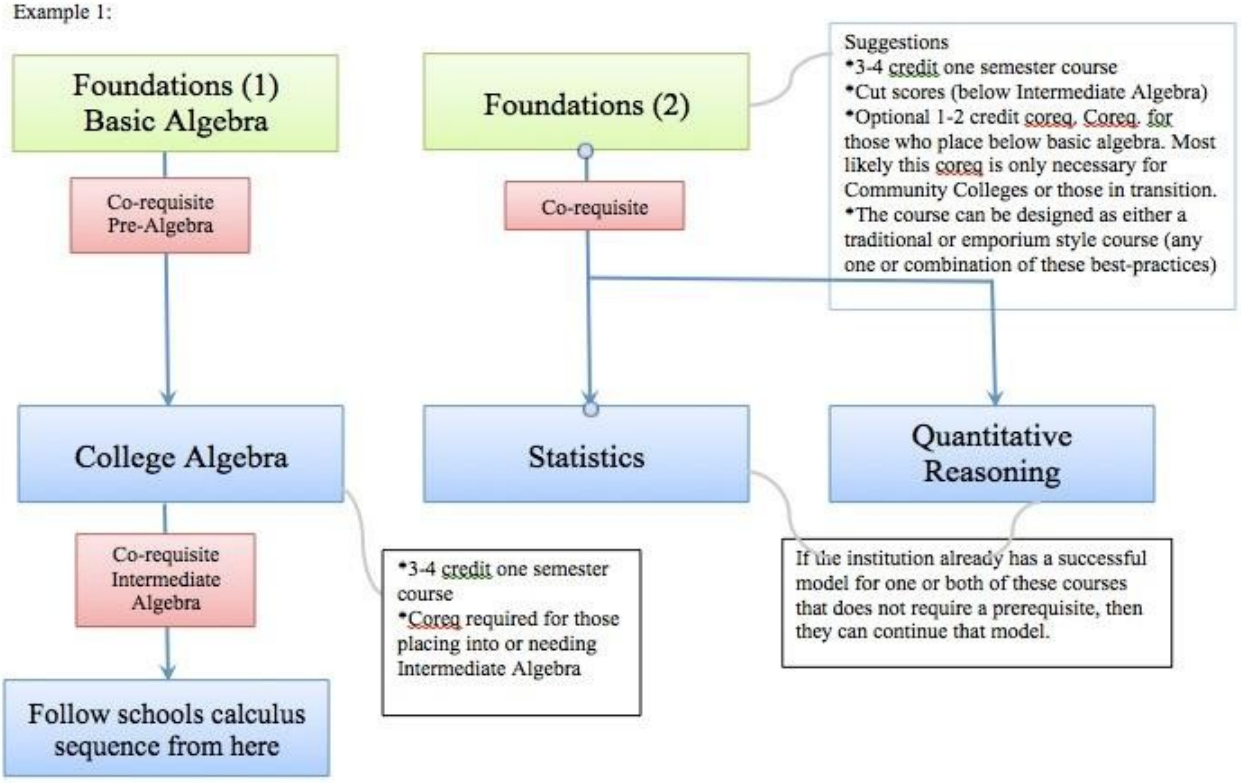

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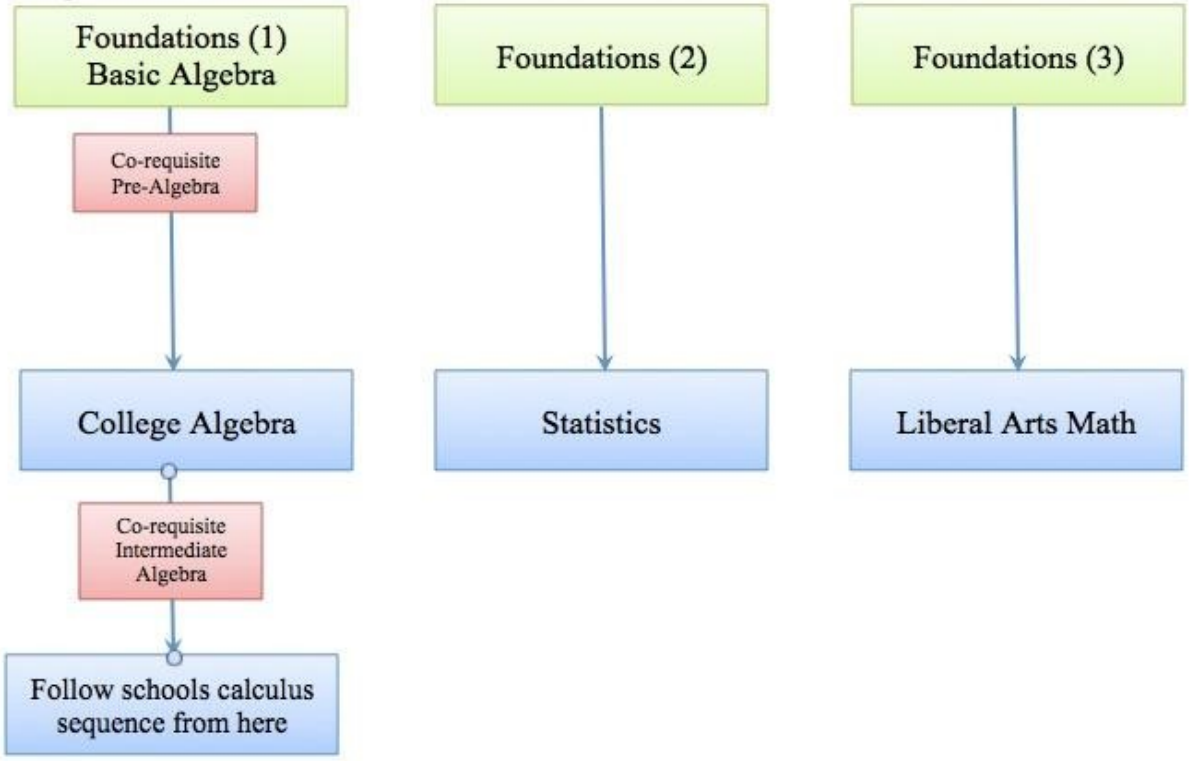

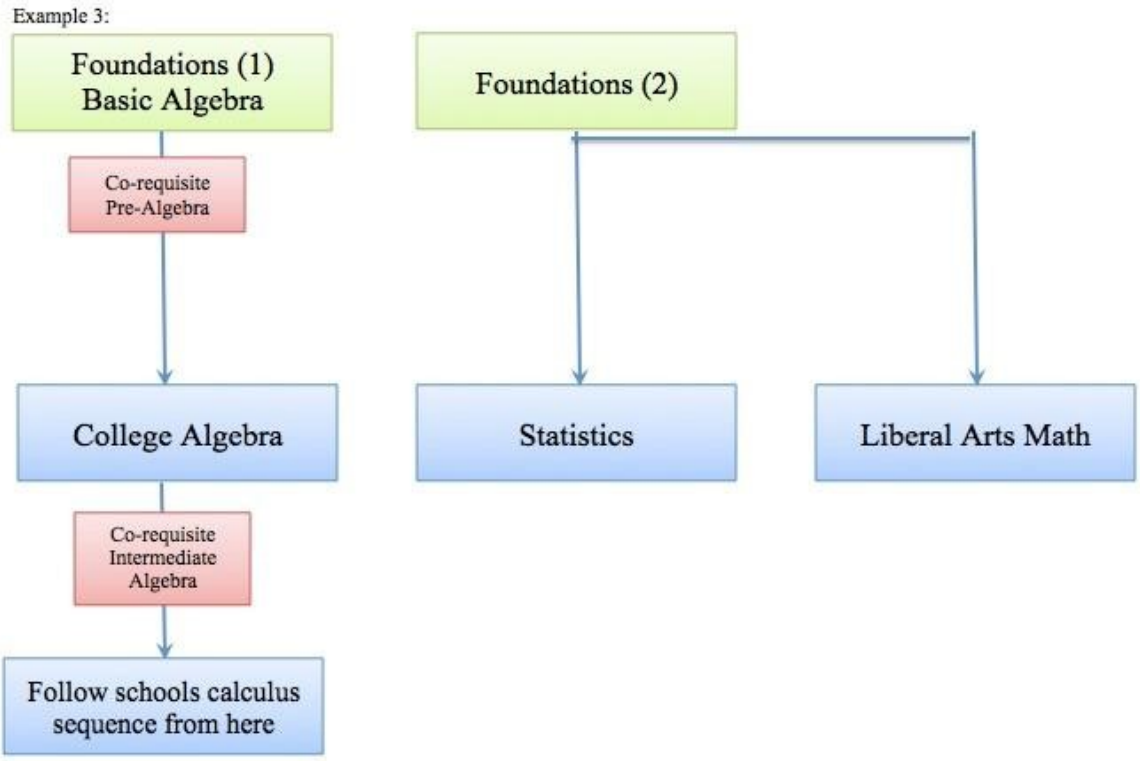

Case for a Longer Pipeline

There are several key factors any institution must look at when designing/examining its own developmental studies pathways: population, size, developmental placement rate, history of the region, instructor's pedagogy, and most importantly what works historically, statistically, and pedagogically. When your institution examines its own developmental program you may find that our recommendations do not serve your student population with the highest rates of success. Any one of the forenamed factors may be causing this discrepancy. In this section we will address two examples of the possible shortcomings of shortening the pipeline and allow you to conjecture as to why they were an ineffective way to increase retention and graduation rates. In short, we will make the case that, as an institution, you must decide for yourself what is most effective for your student population.

What is the Traditional Model?

The traditional model of developmental studies is different from the co-requisite model in a number of key ways. The traditional model of remediation can consist of 2 to 5 courses with a clearly defined boundary between mathematics taught in high school and math that is new to the average student entering college. In contrast, the co-requisite model combines multiple levels of math in a structure

that is outlined above. Another key difference is that the traditional model of remediation has been studied and analyzed for decades and much more data about its effectiveness, as well as alternative practices, is available. Just this year, research in the Community College Review stated, "Despite the push for alternative approaches, the traditional model prevailed in the delivery of developmental math over time" (Kosiewicz, 2016, p. 205) Finally, it is important to note that the traditional model has probably been taught by your instructors and refined by them for many years, and was probably the way they learned mathematics.

Why a Longer Pipeline Does Help Some Students

It can be effectively argued that not all students will benefit from a shortened pipeline because not all students are taking remedial math courses for the same reason. Dr. Jack Rotman of New Life Project suggests that there are three main reasons students take a remedial course.

The first reason he offers is that students place into remedial mathematics because they never learned the material to begin with. Without much imagination, we can easily hypothesize that this particular group of students would benefit from a slower paced curriculum with smaller incremental gains. We are able to draw this conclusion because the student has already been presented the material once, and did not effectively ingest the learning objectives when taught over a four year period.

The second reason Dr. Rotman suggests that a student may be taking a remedial math course is that s/he misunderstood the material. This would suggest that this student understands the processes but not how to use them. Again, one could argue that a slower-paced, more in-depth, look at *the how* and *the why* might benefit this type of student.

Finally, Dr. Rotman suggests that a third group of students exist that have forgotten the material. If we expand this group to include students that are victims of poor placement, we finally find a group of students that would have a high probability of benefiting from an accelerated model (co-requisite), which covers many topics in one semester. In all likelihood, students that either placed poorly or have forgotten the material would thrive in an environment that allows them to take larger credit courses, with more topics. Regardless, it is clear that we must begin to examine remedial students as three separate entities (Rotman, 2015).

Student Support

If the transformative efforts of math redesign are to have a significant impact on student success in gateway courses, a strong advising and support system must be designed and implemented. This

system should include a working relationship amongst student services, Institutional Research, academics and advising.

Students, faculty and professional staff need to clearly understand the new system guidelines and the rationale behind the changes. This knowledge must be disseminated to all advising points of contact. Without intensive support, the implementation of the new initiatives will not result in the student success being targeted.

This education and support will provide the tools and knowledge to:

1. Support students as they select the appropriate math pathway for their chosen program of study,
2. Match each student's needs to the new support structures (Foundations, co-requisite, self-paced, etc.), and
3. Understand the new placement index (multiple measures) that predict the probability of the student's success in a gateway math course.

Ultimately, with a unified advising system in place, students will be given the support and focus needed to persevere and succeed.

Program Review

To ensure the effectiveness of reform it is important that there is a clear internal review process in place. When designing new processes, it is important to set clear benchmarks and goals that can be measured and are statistically significant. New processes/programs should be reviewed every two years and once they are determined to be successful can go four to five years between reviews. The review process should include a review of success rates in the individual courses, success rates in subsequent courses, retention rates and overall graduation rates as a function of academic indicators such as high school GPA, Math ACT scores, and placement exam scores.

The review process should include a self-study, data analysis, and a presentation to a committee of faculty who would then make recommendations for improvement. Below is an example of self-study questions for a program review process from SFCC.

Week 2: Answer question sets 1 and 2 – Bring to the Week 3 meeting	
	Question Set 1 – Program-level Learning Assessment
1.a	Describe your program's key *processes* for assessing program-level learning outcomes. Include information on the types of tools/methods/instruments used in the assessment process.
1.b	Describe the overall level of deployment of program-level assessment processes within your program. (*Results*)
1.c	Summarize the *results* of program-level learning assessments (including tables and figures when possible).
1.d	Describe any post-degree examinations, certifications or transfers that exist for graduates of your program. Provide the *results* (pass rates, etc.).
1.e	Describe the specific *improvements* to program-level learning assessment that have been implemented or will be implemented in the next 1 – 4 years.
	Question Set 2 – Program Design
2.a	Describe the *process* you use to review the viability of courses in your program.
2.b	What is the *process* for scheduling courses in each of your department's programs and certificates in such a way that students can complete the degree or certificate in the minimum amount of time?
2.c	Describe the key *processes* your program uses for evaluating and ensuring program rigor for all modalities and locations.
2.d	Describe how you evaluate the design of your program and how you track the *results*.
2.e	Summarize recommendations from any accreditation site visits during the past four years. (*results*)
2.f	Discuss *improvements* that have been made as a result of recommendations from accreditation site visits.
2.g	What *improvements* to program design have been implemented or will be implemented in the next 1-4 years?

Conclusion

In the current developmental reform climate the goal is to increase the number of students who complete their gateway math course and hopefully improve the student's chance of graduating from college. The research on the effect of math placement on student success in college math is at least ten years old and shows clearly that reducing the number of developmental math courses students take will substantially increase most students chances of completing their gateway math course. This increased chance of passing their math gateway course probably has a small but positive effect on their chances of being retained and graduating. Developmental reform is never just a change in developmental curriculum, but also a reform of placement practices, advising practices, academic support practices, etc.. We have suggested throughout this report that, instead of doing one sweeping reform, an institution considering doing reform in stages. The body of research could benefit significantly from a better understanding of which reform practices are the most effective, how they work best and who they work best for. By reforming intake processes first, such as placement and advising colleges will have a better idea of what part(s) of their curriculum will need to be reformed.

What we suggest is an integrative approach instead of just shortening pathways since each college is different. It is also important to remember that there is no one-size-fits-all solution to developmental education. Making sure that students have options and that faculty and colleges have the time and resources to make changes is vital to ensure that all students have the opportunity to be successful. By ensuring that students are properly placed, offering developmental pathways appropriate to each gateway course, reducing exit points by shortening pathways wherever

possible, and keeping longer/self-paced options available for those who need it, you can save students time without marginalizing anyone.

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